North Carolina Department of Environment and Natural Resources
Division of Water Resources
Water Sciences Section

Biological Laboratory Certification Application

Please be sure to include/mail:

1. **Check for fees.**
2. **Résumés for new personnel.**
3. **Standard Operating Procedures Document updates or revisions.**
4. **Reference Toxicant Data and Control Charts.**

Pages 2-5 of this document **must** be completed. Subsequent pages may be completed if necessary to document changes at the laboratory since the last certification renewal.

Company Name _____

Lead contact from this laboratory for correspondence from DWR _____

Phone _____ Fax _____

Email address _____

Physical street address _____

Mailing address (if different from physical address) _____

Please list any North Carolina certifications for wastewater chemical analyses or any non-DWR biological certifications maintained by the laboratory: _____

_____

_____

_____

_____

_____

Has this laboratory ever been denied certification or decertified for performing toxicity testing or aquatic population survey and analysis? Which state(s) and why? _____

_____

_____

_____

The following information is necessary for shipment of certification performance evaluation samples:

Preferred Overnight Carrier _____ Account # _____

Must be capable of picking up packages in Raleigh, NC.

Personnel for Aquatic toxicity testing/Biological survey (Please attach resume for each person listed.)

Laboratory Supervisor

Name/Title _____

Academic Training _____

Professional Certifications _____

_____

Substitute Supervisor

Name/Title _____

Academic Training _____

Professional Certifications _____

_____

Other personnel involved with toxicity testing and/or biological survey:

Name/Title _____

Academic Training _____

Professional Certifications _____

_____

Name/Title _____

Academic Training _____

Professional Certifications _____

_____

Name/Title _____

Academic Training _____

Professional Certifications _____

_____

Name/Title _____

Academic Training _____

Professional Certifications _____

_____

Name/Title _____

Academic Training _____

Professional Certifications _____

_____

Laboratory Specifications

Total laboratory area in square feet _____

Total linear bench space in feet _____

What is the culture water source for organisms to be used in NC tests? _____

What is the dilution water source for North Carolina tests? _____

Categories Desired for Certification

List parameters(organisms) desired under each category.
Active cultures are required for certification. Regulatory testing performed with organisms not maintained as a viable reproducing culture may be considered on a case by case basis by the Aquatic Toxicology Unit. Cladocerans must be cultured in-house.

☐ (1) Acute Toxicity Testing/Invertebrate

_____ _____

_____ _____

☐ (2) Acute Toxicity Testing/Vertebrate

_____ _____

_____ _____

☐ (3) Chronic Toxicity Testing/Invertebrate

_____ _____

_____ _____

☐ (4) Chronic Toxicity Testing/Vertebrate

_____ _____

_____ _____

☐ (5) Aquatic Population Survey and Analysis-Check desired parameters.

- ☐ fish
- ☐ macroinvertebrates
- ☐ algae
- ☐ aquatic macrophytes

☐ (6) Algal and Aquatic Plant Toxicity Testing

_____ _____

_____ _____

Total number of categories desired for certification: _____

Certification Renewal Rate Schedule

Number of categories	Fee
1	$500.00
2	$900.00
3	$1,300.00
4	$1,700.00
5	$2,100.00
6	$2,500.00

Checks should be made payable to: North Carolina Department of Environment and Natural Resources.

Please Note: All returned checks will be charged a $25.00 processing fee.

Total cost of certification renewal: _____ Check number: _____

Attach check here:

This document and the attached check are submitted for Biological Laboratory Certification by the State of North Carolina per 15A NCAC 02H.1101-1110. Unless superseded by additional documentation, previous information submitted in the standard operating procedures document and application accurately reflect procedures with respect to aquatic toxicity testing currently in practice at this laboratory and that follows the Criteria and Procedures Document listed on our website.

_____ _____

Signature of Laboratory Supervisor Date

Please submit all materials to:

via US Mail:
NC Department of Environment and Natural Resources
DWR/Water Sciences Section
1623 Mail Service Center
Raleigh, NC 27699-1621
Attn: Cindy Moore

via UPS or Federal Express:
NC Department of Environment and Natural Resources
DWR/Water Sciences Section
4401 Reedy Creek Road
Raleigh, NC 27607
Attn: Cindy Moore

Culturing (These pages may be duplicated as necessary for multiple cultures. Use additional sheets as required.)

Organism _____

Original Source _____

Date(s) obtained _____

Describe the culturing system, including vessels and environmental controls: _____

Describe culturing strategy including population control, culture water replacement, food type, feeding frequency and amount, special substrates, etc.: _____

How is the age of the organisms determined for testing purposes? _____

What is the source of culture water? _____

How is the culture water prepared (treated) before use? _____

What is the average hardness of culture water when used in the culture? _____

before being treated? _____

How is the culture water stored? _____

What analyses are performed on the culture water, and what is the frequency of these analyses? _____

Describe any additional quality assurance procedures utilized. _____

Reference toxicant is used to determine population health: _____

Source of this toxicant: _____

Frequency that reference toxicant tests are performed: _____

What dilution water is utilized for these tests? _____

How is each reference toxicant test evaluated graphically? _____

What are the consequences of out–of–range values? _____

Are EPA certified reference toxicant samples analyzed? _____ How often? _____

Which personnel are responsible for taxonomic identification of the organism? _____

_____

How often are these identifications accomplished? _____

What references are used for this identification? _____

Are representative specimens preserved and/or mounted? _____

If so, at what intervals? _____

Testing

These pages should be duplicated for each test type/organism combination applied for.

Category _____

Organism _____

Test Type _____

Describe all environmental systems employed in testing for the control of temperature, light intensity, photoperiod, etc.

_____

_____

List the manufacturer, composition, and volume of testing vessels employed. _____

_____

_____

List types and composition of dosing equipment (diluters, pipettes, etc) employed. _____

_____

_____

How is dilution water treated prior to use? _____

_____

What analyses are performed on the water, and how frequently are these conducted? _____

_____

How is the dilution water stored? _____

_____

What is the average hardness of the dilution water before treatment? _____

after treatment? _____

List any replicate, blank, or blind analyses performed as part of in–lab quality assurance of toxicity testing (the analyses and responses to be detailed in the Standard Operating Procedures Document): _____

_____

_____

Testing Equipment

*Any changes in this equipment list that affects the ability to perform testing should be reported to the Aquatic Toxicology Branch within 30 days of such change. **Failure to do so could result in categorical decertification.***

Equipment	**Make**	**Model**	**Calibration method (if any)**
NIST traceable thermometer			
D.O meter			
pH meter			
chlorine analysis			
conductivity meter			
hardness analysis			
Refrigerator			
Incubator			
dissecting microscope			
compound microscope			
light meter			
Hemacytometer			
Autoclave			

Centrifuge			
shaker table			
Spectrophotometer			
Fluorometer			

Additional equipment: _____

List any replicate, blank, or blind analyses performed as part of in-lab quality assurance of water quality measurements performed in toxicity testing (the analyses and responses to be detailed in the Standard Operating Procedures Document): _____

Sampling

Will your facility provide sample collection equipment or conduct sampling for North Carolina clients? _____

Does your facility employ automated sampling equipment? _____

If so, list equipment used: _____

What type of collection vessels and shipping containers will be provided to clients? _____

What commercial carriers are used for sample shipment? _____

Outline sampling procedures, including instructions to sampling personnel, and sample identification: _____

Are sample temperatures recorded on receipt of sample? _____

Are total residual chlorine measurements recorded on receipt of sample? _____

Is a sample log maintained? _____

Chain-of-Custody

Will adhesive seals and/or lockable shipping containers be provided to clients? _____

Outline the chain-of-custody instructions provided to clients and the steps taken at your lab upon receipt of the sample:

Data Analyses

List data analysis techniques employed for each test endpoint (These should be described in detail in the Standard Operation Procedures document): _____

Describe how data calculations, data entry, and statistical analyses are quality assured: _____

Aquatic Population Survey and Analysis

General Equipment List

List general sampling and sample identification equipment:

Equipment	Make	Model
dissecting microscope		
compound microscope		

Fish

Sample Collection

Will your facility provide sample collection equipment or conduct sampling for North Carolina clients? _____

If so, what type of collection equipment and shipping containers will be provided to clients? _____

What commercial carriers are used for sample shipment? _____

List sampling and sample identification equipment:

Equipment	Make	Model	Calibration method (if any)
Weighing scales			
Length measuring device			
Backpack shocker			
Generator			
Nets (list)			

Additional equipment: _____

Describe collection techniques employed, including the purpose of each technique and sample identification (attach additional pages, if necessary. _____

Describe sample preservation techniques used: _____

Chain-of-Custody

Will adhesive seals and/or lockable shipping containers be provided to clients? _____

Describe chain-of-custody procedures and the steps taken at your lab upon receipt of the sample: _____

Is a sample log maintained? _____

Identification

Are reference organism collections available for taxonomic review? _____

Where is the reference collection maintained or with whom are the specimens vouchered? _____

Are reference or whole samples from population surveys maintained at least one year after collection? _____

Are copies of all taxonomic guides and references specified by the Division of Water Resources located in the laboratory (see Appendix)? _____

List or append other references used for taxonomy or population analyses: _____

Data Analyses

Are you using an Index of Biological Integrity (IBI)? If so, list metrics:

1. _____ 2. _____
3. _____ 4. _____
5. _____ 6. _____
7. _____ 8. _____
9. _____ 10. _____
11. _____ 12. _____

Describe data analysis techniques employed (these should be described in detail in the Standard Operation Procedures document): _____

Describe how data calculations, data entry, and statistical analyses are quality assured: _____

In-lab Quality Assurance

List any replicate, blank, or blind analyses performed as part of in–lab quality assurance of population survey (the analyses to be detailed in the Standard Operating Procedures Document): _____

Macroinvertebrates

Sample Collection

Will your facility provide sample collection equipment or conduct sampling for North Carolina clients? _____

If so, what type of collection equipment and shipping containers will be provided to clients? _____

What commercial carriers are used for sample shipment? _____

List sampling and sample identification equipment:

Equipment	Make(s)	Model(s)	Net Mesh Size
Trawls			
Dredges			
Box sampler			
Hess sampler			
Surber sampler			
Sweep net, please specify type:			

Additional equipment: _____

Describe collection/picking techniques employed, including the purpose of each technique and sample identification (attach additional pages if necessary): _____

Describe sample preservation techniques used: _____

Chain-of-Custody

Will adhesive seals and/or lockable shipping containers be provided to clients? _____

Describe chain-of-custody procedures and the steps taken at your lab upon receipt of the sample: _____

Is a sample log maintained? _____

Identification

Are reference organism collections available for taxonomic review? _____

Are reference or whole samples from population surveys maintained at least one year after collection? _____

Are copies of all taxonomic guides and references specified by the Division of Water Resources located in the laboratory (see Appendix)? _____

List or append other references used for taxonomy or population analyses: _____

Data Analyses

Describe data analysis techniques employed (these should be described in detail in the Standard Operation Procedures document): _____

Describe how data calculations, data entry, and statistical analyses are quality assured: _____

In-lab Quality Assurance

Discuss analyses performed as part of in–lab quality assurance of population survey (the analyses to be detailed in the Standard Operating Procedures Document): _____

TAXONOMY for Benthic Macroinvertebrates

The following list specifies those genera that can normally be taken to the species level using readily available and accepted taxonomic keys. Many other genera can be taken to the species level by using various papers, in-house keys, unpublished manuscripts and other such sources that will differentiate species. Species level identification should be undertaken whenever possible.

For more information regarding taxonomic effort, please refer to the North Carolina Taxonomic guides for the most current levels of taxonomic effort for Ephemeroptera, Plecoptera, Trichoptera, and Aquatic Coleoptera of North Carolina. Those publications can be found at this link: http://portal.ncdenr.org/web/wq/taxonmanual. For groups not included with this link, please contact Eric Fleek at eric.fleek@ncdenr.gov for further information.

EPHEMEROPTERA

Baetis	*Baetisca*	*Drunella*
Ephemerella	*Eurylophella*	*Neoephemera*
Serratella	*Stenacron*	*Stenonema*

PLECOPTERA

Acroneuria	*Agnetina*	*Diploperla*
Helopicus	*Isogenoides*	*Isoperla*
Paragnetina	*Perlinella*	

TRICHOPTERA

Brachycentrus	*Ceraclea*	*Diplectrona*
Hydropsyche	*Micrasema*	*Molanna*
Neophylax	*Nectopsyche*	*Psychomyia*
Rhyacophila	*Symphitopsyche*	*Triaenodes*

ODONATA

Boyeria	*Neurocordulia*

MEGALOPTERA

Chauliodes	*Nigronia*

COLEOPTERA

CRUSTACEA

OLIGOCHAETA (if mature specimens)

Allonais	*Amphichaeta*	*Arcteonais*
Bratislavia	*Paranais*	*Haemonais*
Stylaria	*Ophidonais*	*Tubifex*
Slavina	*Specaria*	*Spirosperma*
Uncinais	*Vejdovskyella*	*Aulodrilus*
Bothrioneurum	*Branchiura*	*Haber*
Ilyodrilus	*Isochaetides*	*Limnodrilus*
Potamothrix	*Quistadrilus*	

DIPTERA

Ablabesmyia	*Cricotopus*	*Labrundinia*
Orthocladius	*Polypedilum*	

Algae

Sample Collection

Will your facility provide sample collection equipment or conduct sampling for North Carolina clients? _____

If so what type of collection equipment and shipping containers will be provided to clients? _____

What commercial carriers are used for sample shipment? _____

List sampling and identification equipment:

Equipment	Make	Model	Calibration method (if any)
Microscope			

Additional equipment: _____

Describe collection techniques employed, including the purpose of each technique: _____

Describe sample preservation techniques used: _____

Describe identification and enumeration techniques employed: _____

Chain-of-Custody

Will adhesive seals and/or lockable shipping containers be provided to clients? _____

Describe chain-of-custody procedures and the steps taken at your lab upon receipt of the sample: _____

Is a sample log maintained? _____

Identification

Are reference algae collections available for taxonomic review? _____

Are reference or whole samples from population surveys maintained at least one year after collection? _____

Are copies of all taxonomic guides and references specified by the Division of Water Resources located in the laboratory (see Appendix)? _____

List or append other references used for taxonomy or population analyses: _____

Data Analyses

Describe data analysis techniques employed (these should be described in detail in the Standard Operation Procedures document): _____

Describe how data calculations, data entry, and statistical analyses are quality assured: _____

In-lab Quality Assurance

List any replicate, blank, or blind analyses performed as part of in–lab quality assurance of population survey (the analyses to be detailed in the Standard Operating Procedures Document): _____

Taxonomic Reference List

Phytoplankton identifications should be taken to at least the genus level, and to species level when possible. Please provide a list of the taxonomic nomenclature (i.e., taxa list) being used and supporting reference materials. A copy of the Taxonomic Reference Table used by DWR can be found at:
http://portal.ncdenr.org/c/document_library/get_file?uuid=5a9f0eda-c42f-4bd5-801c-f50ed96ea6c0&groupId=38364

Aquatic Macrophytes

Describe specimen collection techniques: _____

If quantitative sampling is conducted, please describe List sampling techniques and equipment: _____

Describe sample preservation techniques used: _____

Are reference plant collections available for taxonomic review? _____

Are reference or whole samples from population surveys maintained at least one year after collection? _____

Describe chain-of-custody procedures: _____

Are copies of all taxonomic guides and references specified by the Division of Water Resources located in the laboratory (see Appendix)? _____

List or append other references used for taxonomy or population analyses: _____

Describe data analysis techniques employed: _____

Appendix: Required and Recommended References

FISH REFERENCES

REQUIRED

Menhinick, E.F. 1991. The Freshwater Fishes of North Carolina. North Carolina Wildlife Resources Commission, Raleigh, N.C. 227 pp.

RECOMMENDED

Rohde, F.C., Arndt, R.G., Foltz, J.W., and J.M. Quattro. 2009. The Freshwater Fishes of South Carolina. University of South Carolina Press. 430 pages.

Etnier, D.A. and W.C. Starnes. 1993. The Fishes of Tennessee. University of Tennessee Press. Knoxville, TN. 681pp.

Jenkins, R.E. and N.M. Burkhead. 1993. Freshwater Fishes of Virginia. America Fisheries Society. Bethesda, MD.

BENTHIC MACROINVERTEBRATE REFERENCES

REQUIRED

Standard Operating Procedures for Benthic Macroinvertebrates, Biological Assessment Unit, July 2006, DENR/DWQ/WQS/ESB

Beaty, S.R. Taxonomy Document with Standard Taxonomic Effort Levels for Ephemeroptera of North Carolina. NCDENR, DWQ, Biological Assessment Unit. November 2010.

Beaty, S.R. Taxonomy Document with Standard Taxonomic Effort Levels for Plecoptera of North Carolina. NCDENR, DWQ, Biological Assessment Unit. November 2010.

Beaty, S.R. Taxonomy Document with Standard Taxonomic Effort Levels for Trichoptera of North Carolina. NCDENR, DWQ, Biological Assessment Unit. November 2010.

Beaty, S.R. Taxonomy Document with Standard Taxonomic Effort Levels for Coleoptera of North Carolina. NCDENR, DWQ, Biological Assessment Unit. November 2010.

Kathman, R.D., and R.O. Brinkhurst. 1998. Guide to the Freshwater Oligochaetes of North America. Aquatic Resources Center, College Grove, TN. 264 pp.

Ciegler, J.C. 2003. Water Beetles of South Carolina (Coleoptera: Gyrinidae, Haliplidae, Noteridae, Dytiscidae, Hydrophildae, Hdyraenidae, Scirtidae, Elmidae, Dryopidae, Limnichidae, Heteroceridae, Psephenidae, Ptilodactylidae, and Chelonariidae). Biota of South Carolina. Vol. 3. Clemson University, Clemson, S.C. 207 pp.

Wiggins, G.B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto.

Stewart, K.W. and B.P. Stark. 2002. Nymphs of the North American Stonefly Genera (Plecoptera). Second Edition. The Caddis Press. Columbus, Ohio, xii + 510pp.

Epler, J.H. 2001. Identification Manual for the Larval Chironomidae (Diptera) of North and South Carolina.

Epler, J.H. 2006. Identification Manual for the Aquatic and Semi-aquatic Heteroptera of Florida (Belostomatidae, Corixidae, Gelastocoridea, Gerridae, Hebridae, Hydrometridae, Mesoveliidae, Naucoridae, Nepidae, Notonectidae, Ochteridae, Pleidae, Saldidae, Veliidae).

Gelhaus, J.K. 2002. Manual for the Identification of Aquatic Crane Fly Larvae for Southeastern United States.

Burch, J.B. 1982. Freshwater Snails (Mollusca: Gastropoda) of North America.

Tennessen, K. 2004. CABW Odonata Manual (A Guide to Identifying Odonata Larvae of the Carolinas).

Bogan, A.E., and J.M. Alderman. 2008. Workbook and Key to the Freshwater Bivalves of South Carolina. Revised Second Edition.

Holsinger, J.R. 1972. The Freshwater Amphipod Crustaceans (Gammaridae) of North America.

Williams, W.D. 1976. Freshwater Isopods (Asellidae) of North America.

Klemm, D.J. 1995. Identification Guide to the Freshwater Leeches (Annelida: Hirudinea) of Florida and Other Southern States.

Brigham, A.R., and W.U. Brigham. 1982. Aquatic Insects and Oligochaetes of North and South Carolina. Midwest Aquatic Enterprises, Mahomet, Illinois. 837 pp.

Merrit, R.W., and K.W. Cummins, and M.B. Berg (editors). 2008. An Introduction to Aquatic Insects of North America. Fourth Edition. Kendall Hunt Publishing. Dubuque, Iowa. 1158 pp.

PHYTOPLANKTON REFERENCES

REQUIRED

Wehr, J.D. and R.G. Sheath (eds.) 2003. Freshwater Algae of North America: Ecology and Classification. Academic Press. San Diego, California. 918 pp.

Whitford, L.A. and G.J. Schumacher. 1984. A Manual of Fresh-water Algae. Sparks Press, Rockingham, N.C. 337 pp.

RECOMMENDED

Kramer, Kurt, and Lange-Bertalot, Horst. Suswasserflora von Mitteleuropa. Stuttgart: Gustav Fischer Verlag, 1991. Teils 1-4.

Patrick, Ruth and Charles W. Reimer. 1966. The Diatoms of the United States, Vol. 1. Academy of Nat. Sci. of Philadelphia, Philadelphia, Pa. 688 pp.

Prescott, G.W. 1973. Algae of the Western Great Lakes Area. Wm. C. Brown Co. Pub., Dubuque, Iowa. 997 pp.

AQUATIC PLANT REFERENCES

REQUIRED

Aulbach-Smith, C.A. and S.J. deKozlowski. 1990. Aquatic and Wetland Plants of South Carolina. South Carolina Water Resources Commission, Columbia SC. 123 pp.

Copies can be obtained from: Publications Coordinator, SC Water Resources Commission, 1201 Main St., Suite 1100, Columbia, SC 29201. (803) 737- 0800

RECOMMENDED

Beal, Ernest O. 1977. A Manual of Marsh and Aquatic Vascular Plants of North Carolina, with Habitat Data. The North Carolina Agriculture Research Service, Raleigh, NC.

Copies can be obtained from: North Carolina Agriculture Research Service, NC State University, Raleigh, NC 27695

Gleason, H.A. and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada, 2nd edition The New York Botanical Garden, The Bronx, NY, NY. 910 pp.

Gleason and Cronqist's second edition includes the recent changes in plant nomenclature.

Godfrey. R.K. and J.W. Wooten. 1979. Aquatic and Wetland Plants of Southeastern United States: Monocotyledons. University of Georgia Press. Athens, GA.

Godfrey. R.K. and J.W. Wooten.1981. Aquatic and Wetland Plants of Southeastern United States: Dicotyledons. University of Georgia Press. Athens, GA.

Radford, A.E., H.E. Ahles and C.R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. The University of North Carolina Press, Chapel Hill, NC. 1184 pp.

Although Radford et al. is outdated, it is still a superb reference text and the only one that covers all vascular plants for North Carolina